

AMENDMENTS TO THE SPECIFICATION

(1) Please amend the “Detailed Description of Embodiments” section of the specification (from page 6, line 17 to page 15, line 8) as shown in the following replacement section:

Detailed Description of Embodiments

Referring more specifically to the drawings, the same reference numerals are used throughout for the same or like parts in all embodiments described below.

Figures 2 through 6 illustrate one embodiment of a wrench in accordance with the present invention in which a wrench (1) comprises a single flexible ring-like head portion (2), an elongate handle (3) and an intermediate interconnecting portion (4) allowing pivotable movement between the head portion (2) and handle portion (3).

The handle portion (3) is conveniently of a consistent rectangular cross-section along its length except at each of its opposed ends where the handle has a portion (5) which tapers outwardly as shown more clearly in Figures 5 and 6, to terminate in rounded corners (6) extending into a laterally extending flat transverse surface (7) relative to an elongate axis of the handle (3).

Two circular apertures (9,10) are located in the outwardly tapered portion (5) of the handle (3), at each opposed end thereof. Preferably, a rivet (11) is located in each one of the apertures (9,10), respectively, for attaching plates (12,13) relative to the handle (3). The plates (12,13) extend parallel outwardly from the handle, in a direction parallel to the longitudinal axis of the handle (3). A gap (14) is provided between the plates for receiving the head portion (2) therein.

Head portion (2) is of a split ring-like configuration having a substantially circular external surface (15) extending on opposite sides into a pair of short arms (16,17) separated by a gap (20) therebetween. A slot (21,22) is located in each arm, respectively. The slots taper outwardly from near inner ring surface ([[2b]]25) one relative to the other towards outermost extremities of the arms (16,17) which each terminate in a curved surface (23,24), respectively, facing the transverse surface (7) of the handle (2). Rivets ([[25]]11a) extend freely through each slot (21,22), respectively, and serve to hold the head portion (2) between plates (12 and 13) for pivotal movement of the head portion relative to the handle (3). The rivets (11) and the rivets ([[25]]11a) are fixed one relative to the other.

Internal surface (25) of the head portion (2) is of a polygonal shape, being in this embodiment of a hexagonal configuration, with each side being a flat planar surface (26). A recess (27) is located at each end of each flat surface (26) (Figure 3) for ensuring the resilience of the head portion (2) to close gap (20) when the need arises, to clamp and rotate the fastening devices. An edge (28) between two adjoining flat surface (29,30) of a fastening device [[(31),]] such as a hexagonal headed bolt ([[32]]31), is located at the recess (27) when the wrench is in a rest position as illustrated in Figure 3.

In one operable condition as illustrated in Figure 4, in which torque is applied to the ~~fastener/fastening device~~ head of the bolt (31) the flats (26) of the internal surface of the head portion (3) engage the fastening device towards the junction (28) between flats (29,30) for example of a bolt [[head]] ([[32]]31).

The operation of the wrench disclosed in Figures 2 through 6 is more clearly illustrated in sectional views of Figures 5 and 6. Figure 5 shows the wrench engaging a bolt ([[32]]31) and to be in a central rest position in which curved surfaces (23,24) both engage transverse surface

(7) of the tapered portion (5). Rivets (11a) are located at the end of their respective slot (21,22) remote from the end surface (23,24) of the arms (16,17).

Assuming it is intended to untighten bolt ([32]31) by rotating it counter clockwise, torque is applied to the handle (3) in the direction indicated by arrow A in Figure 6 by placing a thumb against arm 17, fingers around the handle (3) and pulling with the fingers while holding the head (2) stationary. As handle (3) moves in direction A, the head portion (2) moves about the bolt (32) until the internal surface (25) of the head portion engages the external surface flats (29,30 etc) of the bolt head (32) in the manner shown in Figures 4 and 6.

Further torque applied in the direction of arrow A causes the transverse surface (7) to move around the curved surface (24) of arm (17) and the rivet ([25]11a) in slot (21) to move along the slot (21) towards the slot end adjacent curved surface (23) of arm (16). As the rivet (11a) moves along slot (21) the inclination of the slot and the interaction with the rivet (11a) causes the arm (16) to move towards arm (17) closing gap (20) and increasing the pressure upon bolt ([32]31) to untighten the bolt.

If the contrary action is required, that is to tighten the bolt ([32]31), torque would be applied in the opposite direction as indicated by arrow C and the transverse surface (7) will move about curved surface (23) of arm (16). The rivet (11a) will subsequently move along slot (22) moving arm (17) in towards arm (16) closing gap (20) and applying increasing pressure upon bolt ([32]31) to tighten the bolt.

In either of the above operations the closing of the gap (20) together with the resilience of ring headed portion (2) cause the flats (26) thereof to engage the flats (29,30) of the bolt head so that a greater area of the corresponding flats are in engagement and the bolt [[head]]

(~~[[32]]~~31) is then more securely held while tightening or untightening the bolt. The plates (12, 13) with the rivets (11,11a) prevent any lateral separation of the head portion (2) and handle (3).

In one modified form of the invention disclosed in Figures 2 to 6, two ring headed portions are provided at each end of the handle (3), one behind the other, as illustrated in Figure 1 to provide the wrench with an option of being able to fit four different sizes of fastening device using just a single wrench construction. Once one of the head sizes is selected the wrench operates in an identical manner to that just described above with reference to the embodiment of Figures 2 to 6.

Figures 7 and 8 illustrate an alternative embodiment of a wrench according to the present invention. The wrench shown in Figures 7 and 8 is constructed and operates in a substantially identical manner to the wrench disclosed in Figures 2 through 6. Therefore, only the modifications made to the wrench of Figures 7 and 8 will be described in detail hereinafter. Furthermore, because the opposed ends of the wrench are substantially identical only one end of the wrench will be referred to and that is the lower end in Figures 7 and 8.

As shown in Figure 7 a cylindrical recess (40) partially extends axially along the handle (3) from the transverse surface (7) thereof at the end of the tapered portion (5). A coiled compression spring (41) is located within the recess (40) and is arranged to push a ball cam (42) between the free end of arms (16 and 17) of the flexible ring headed portion (2). Figure 7 illustrates the wrench in the rest position in which the ball (42) is forced by the compression spring (41) between mutually facing spaced surfaces of the arms (16,17) to maintain the arms spaced apart to allow the ring shaped headed portion (2) to be easily located over a fastening device to be rotated.

When, as shown in Figure 8, torque is applied to the handle in the anti-clockwise direction of arrow A the basic operation is as described with reference to Figures 5 and 6. However, in this embodiment as the handle (3) moves in the direction A, pressure on the ball is increased and the spring (41) compresses while the ball (42) moves across end surface (23) of arm (16). Continued application of torque results in the combination of slots (21,22) and rivets (11a) closing the gap (20) so that the ring shaped head portion exerts a sufficient increase in pressure upon the fastening device ~~[[31]]~~ to turn the same. Again the operation will be identical to that described for the first embodiment when the handle is driven in the opposite clockwise direction to tighten the fastening device. The spring (41) and ball (42) operate in the same manner for clockwise rotation as described above as for the anti-clockwise direction.

When applied torque is removed the spring (41) and ball (42) act on surface (23) to move the handle to return towards the central position in Figure 7 allowing repositioning of the wrench relative to the ~~fastening device~~ bolt (31).

The head portion (2) in this embodiment is constructed differently in that the internal surface (25) ~~therefore~~ is circular rather than polygonal as in the embodiment of Figs. 2 to 6. The ~~fastening drive device~~ drive device (~~[[31]]~~32) used to fasten or release a fastener has a cylindrical external surface and at least a partial polygonal internal surface. The external surface is gripped by the cylindrical/circular internal surface of the head of the wrench and the internal surface of the ~~fastening devices~~ drive device is polygonal and of a specific size to match the head of a corresponding polygonal shaped bolt for example.

In this regard Figure 7 illustrates a ~~fastening drive device~~ drive device (32) having a square shaped aperture therein while Figure 8 shows a hexagonal shaped aperture. Alternatively, these apertures may be replaced by short posts of about 2.5 cm in length and of similar hexagonal

cross section so that they may be inserted in one socket for example of a set of sockets which would be placed over a device to be fastened.

Figures. 9 and 10 illustrate another embodiment of a wrench in accordance with the present invention. In this embodiment the handle is of a single unitary construction having a recessed portion (45) at one end (46) thereof. The recess is defined in part by an end wall (7) of the previously described embodiments and a flat planar surface (48) extending in an elongate axial direction of the wrench.

Head portion (2) of the wrench lies in the recess (45) against both end wall (7) and on rivets (11a) extending outwardly through slots (21,22) in the head portion as described in regard to the previously disclosed embodiments.

In the embodiment of Figures. 9 and 10 the head portion (2) has an inner cylindrical surface (25) and a smooth curved external surface (15). The wall thickness of the head portion (2) is thinnest at its uppermost closed end in Fig. 9 and gradually increases in thickness until a maximum at the opening (20) between open ends (16,17) of the head portion (2). End surfaces (49,50) of the open ends diverge outwardly from the inner surface (25) of the head portion to the outer surface (15) thereof. The junction between the open end and outer surface is curved and lie adjacent end surface (7).

The operation of the embodiment of Figures. 9 and 10 is the same as that for the previous embodiments excluding the spring and ball detent and therefore will not be further described.

The Figure. 11 embodiment is similar to that of Figures. 9 and 10, and differs only in that the handle portion (3) has, at least at one end, a unitary construction defining a yoke (51) equivalent to two opposed attached plates. The head portion (2), equivalent to that of the

embodiment of Figures. 9 and 10, is located in a recess (52) within the yoke with pins or rivets (11a) secured to the yoke and projection through respective one of two slots (21,22) in arms (16,17) as previously described. The operation of the embodiment of Figure. 11 is again the same described for the previously disclosed embodiments excluding the spring and ball detent and will therefore not be further described.

In one alternative embodiment shown in Figures 12 and 13 a shallow recess 23' is located in surface 23 of each arm (16,17), which acts to hold cam (42) under the force of compression spring 41. When torque is applied, as described with reference to Figure 8, cam 42 moves out from the central position between arms (16,17), Figure 12, across surface (23). Just as the arms (16,17) close together or are at their minimum spacing therebetween, the cam (42) enters recess 23' to hold the wrench in the fully operative or drive position, Figure 13.

When moving the wrench in the opposite direction to reposition the wrench for example, the cam (42) has to be forced out of the recess 23'. This ensures the wrench maintains a tight grip on the bolt being turned, prior to repositioning, even though drive torque has been removed, or the operator's hand is removed or repositioned, without disengaging the wrench from the head of the bolt being turned. Once the cam (42) is out of the recess 23' the spring force of the spring (41) acts to assist in returning the wrench to its central position as shown in Figure 12.

The cam (42) in the embodiment of Figures 12 and 13 is a cylinder having a curved surface at one outer end and a flat transverse surface at its opposite end for engagement by compression spring (41). A ball as in the previously described embodiments could be used.

While the embodiments of Figures 1 to 6 are shown to have a polygonal internal surface, preferably hexagonal, such internal surfaces may be smooth cylindrical/circular surfaces

such as described with reference to the embodiments of Figures 7 to 13. Wherever such a cylindrical/circular construction is used it is ideal for clamping onto bolts having burred edges or cylindrical sockets ~~used to themselves~~ provided with internal polygonal surfaces to engage a bolt head having similarly polygonal external surfaces.

In all such cases the ~~one-way~~ drive tool when clamped onto the external cylindrical surface or substantially cylindrical surface, increases the clamping effect as more and more torque is applied. When movement is required in an opposite direction to say reposition the ~~one way~~ drive tool, the removal of the applied torque causes the clamping effect to be reduced sufficiently for slippage to occur between the ~~one-way~~ drive tool and socket fastening device. Once repositioning has occurred torque can again be applied immediately using the thumb and fingers.

(2) Please amend the Abstract on page 20 of the specification as follows:

ABSTRACT

TORQUE-TIGHTENING WRENCH

A wrench or one way drive has a flexible head (2) with a split aperture (20) for loosely engaging a separate drive such as a socket or the head of a fastener (31) including a nut, bolt, screw or the like ~~(a nut, bolt, screw or the like)~~. Cam means, preferably pins (11,11a), are located on a handle (3) and engage the head (2) preferably through slots (21,22) in the head. The slots diverge outwardly so that as the handle is moved relative to the head the split aperture (20) closes and the flexible head (2) increasingly clamps a drive socket as more torque ~~a drive socket, for example the more and more torque~~ is applied to the handle.